Semester	PG SEMESTER 1
Course	**Major**
Paper Code	M2C4MB26011C
Paper Title	**Modern Tools of Prokaryotic and Eukaryotic Classification**
No. of Credits	**4**
Theory / Practical / Composite	**Composite**
Minimum No. of preparatory hours per week a student has to devote	4 hours/week
Number of Modules	No modules
Syllabus	**Unit 1:** Taxonomic principles, Taxonomic hierarchy, Types of bacterial classification systems, new approaches to bacterial taxonomy (numerical taxonomy, ribotyping, rRNA sequencing, fatty acid profile). **Unit 2:** Microbial diversity: The expanse of microbial diversity, phylogenetic trees and three domain universal phylogenetic trees. Measures and indices of diversity. Concept of conventional and molecular tools. Strategies to study unculturable bacteria. Culture independent molecular methods for identifying unculturable bacteria. Metagenomic analysis. **Unit 3:** General characteristics of various groups of prokaryotes: Eubacteria, Rickettsiae, Chlamydia, Spirochaetes, Actinobacteria, Cyanobacteria, Myxobacteria, Mycoplasma and Archaebacteria. **Unit 4:** Morphology: Morphological features of algae, fungi, bryophyte and pteridophyte and their evolution considering the molecular characterization. Economic importance of these members. Anatomy and morphology of gymnosperms and angiosperms, brief idea of their development and morphogenesis including APC systems. Concept of Chemotaxonomy. **Unit 5:** Interaction between abiotic and biotic factors in an ecosystem, ecological niche, limiting factor, concept of community, fluctuation and succession. Ecological pyramid, energy flow, food chain, food webs and their dynamism, stability and complexity of ecosystem, bio geo chemical cycles, conservation and sustainable development, environmental impact assessment. Ecological modelling: Concept and Approach. **PRACTICAL**

	Calculation of frequency of species through ground quadrat determination, calculation of Shannon Wiener diversity index, calculation of Shannon evenness, calculation of Simpson's index, demonstration of Margalef diversity index.

Learning Outcomes	• Classify microorganisms using classical taxonomic principles and modern bacterial classification methods. • Interpret microbial phylogenetic relationships using diversity measures. • Apply culture-dependent and culture-independent molecular techniques for microbial identification. • Differentiate major prokaryotic groups based on their structural, physiological, and taxonomic characteristics. • Compare the morphological, anatomical, evolutionary, molecular, and chemotaxonomic characteristics of eukaryotes. • Analyze ecosystem structure and function. • Calculate and interpret ecological parameters.	
Reading/Reference Lists	1. . Bergey's Manual of Systematic Bacteriology Whitman, W.B. (Ed.). Springer. 2. Prescott's Microbiology Willey, J.M., Sherwood, L.M., & Woolverton, C.J. McGraw-Hill Education. 3. Microbial Ecology: Fundamentals and Applications Atlas, R.M. & Bartha, R. Pearson Education. 4. Plant Systematics Simpson, M.G. Academic Press. 5. Plant Taxonomy and Biosystematics Singh, C.B. Rastogi Publications. 6. Ecology: From Individuals to Ecosystems Begon, M., Townsend, C.R., & Harper, J.L. Wiley-Blackwell.	
Evaluation	Theory 60 (45+15) CIA-10+3+2	Practical 40 CA (38+2)
Paper Structure for Theory Semester Exam	Full Marks: 45 Short questions: 5 (each 1 mark) from 7 (5x1=5) Long questions: 4 (each 10 marks) from 6 (4x10=40)	